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THE
ONTARIO WATER RESOURCES
COMMISSION

WATER POLLUTION SURVEY
OF THE
TOWNSHIP OF NIAGARA

TY OF LINCOLN

1964

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TOWNSHIP OF NIAGARA - 1964
COUNTY OF LINCOLN

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1964

Report on water pollution
survey of the township of Niagara

80760

R E P O R T

on

WATER POLLUTION SURVEY

of the

TOWNSHIP OF NIAGARA

Dates of Sampling: - May 13, 1964
June 1,2, 1964

Division of Sanitary Engineering

R E P O R T

ONTARIO WATER RESOURCES COMMISSION

A routine water pollution survey was conducted on May 13, and June 1, 2, 1964 in the Township of Niagara. The survey involved sampling of the streams in the township and an examination of pollution conditions in the areas of population concentration, including the community of Virgil and the Police Villages of Queenston and St. Davids.

GENERAL

The Township of Niagara comprises 30,005 acres in the east portion of the County of Lincoln. The township is bordered on the north by Lake Ontario, on the south by the Niagara escarpment, on the east by the Niagara River and on the west by the City of St. Catharines. The township is generally flat except in the vicinity of Queenston and the area comprising the Niagara escarpment. Most of the soil in the township consists of hard clay and clay loam, which explains the frequent failure of septic tank systems. The township has spotted areas with a red sand and sandy loam top soil.

The 1963 assessed population of the township was 8,583 persons. The economy of the township relies to a great extent on fruit farming.

WATER USES

1. Municipal Water Supplies

The Township of Niagara obtains water from three wells and a spring located within the boundaries of the City of Niagara Falls. The Mississauga Beach area is served by the Town of Niagara waterworks system. The City of Niagara Falls supplies water to the Bevan Heights Subdivision and the Police Village of Queenston.

The Police Village of St. Davids has its own waterworks system which derives water from drilled wells.

2. Industrial Water Supplies

The Canadian Cannery Limited plant at St. Davids uses water from Four Mile Creek for boiler make-up purposes. Water for process use is obtained from both the Township of Niagara and St. Davids.

The Avondale Dairy Limited obtains water from private drilled wells.

3. Recreational Uses

The streams in the Township are generally not used for recreational purposes. However, the Niagara River and Lake Ontario provide a setting for boating, swimming and fishing.

4. Agricultural Uses

The streams in the township are used extensively for irrigation of farm crops and for filling tanks of the equipment used in the application of insecticides and other agricultural chemicals. The streams also provide a source of drinking water for cattle.

WATER POLLUTION

1. Sanitary Waste Disposal

(a) Existing Conditions

Mississauga Beach Area

The Mississauga Beach Area is serviced by sanitary sewers which discharge to the waste stabilization lagoon serving the Town of Niagara.

Police Village of Queenston

A watercourse discharging to the Niagara River near the northerly limits of the Police Village of Queenston, receives contaminating wastes from storm sewers and open ditches. Although a house to house sanitary survey has not been carried out, it is suspected that unsatisfactory sewage disposal practices are carried out by a number of homes in the area.

Police Village of St. Davids

Several homes in St. Davids discharge septic tank wastes to a branch of the Four Mile Creek, near the westerly limits of the police village.

Community of Virgil

The business section discharges contaminating wastes to a ditch tributary to Four Mile Creek, which winds through the community. The ditch receives laundry wastes and tile bed leachate from a number of private homes. A few homes in the community have private drains

which discharge sanitary waste water directly to Four Mile Creek.

Other Township Areas

In other areas of the township the building lots are usually sufficiently large enough to permit the installation of an adequate septic tank and tile bed system. However, not all homes employ satisfactory sewage disposal facilities. Two homes upstream from the Canadian Cannery Limited dumping area, were discharging contaminated wastes to the watercourse.

In this type of survey it is generally not feasible to investigate the sewage disposal facilities serving each individual household or establishment. However, the results of the stream samples indicate the areas where more detailed investigations should be conducted.

(b) Proposed Sewage Works

At the present time no sewage works are being considered in the township other than a sewer extension in the vicinity of Mississauga Beach. However, in 1958 the Police Village of Queenston had considered a sewerage system, but it was considered that the financial position was unfavourable.

2. Refuse Disposal

The refuse disposal area located near Mississauga Beach contributes leachate to a swampy area which would overflow to Two Mile Creek during periods of rainfall. This site is also used by the

Town of Niagara. A sample from the swampy area had the following characteristics:

<u>5-Day BOD</u> <u>(ppm)</u>	<u>Solids (ppm)</u>			<u>M.F. Coliform</u> <u>per 100 ml</u>
	<u>Total</u>	<u>Susp.</u>	<u>Diss.</u>	
45	1092	552	540	1,600,000

The refuse disposal area should be isolated from the water-course by means of a suitable dyke.

The other municipal refuse disposal site did not appear to cause water pollution. However, the means of refuse disposal may be subject to comment under the jurisdiction of the Medical Officer of Health.

The Canadian Cannery Limited is disposing of its solid wastes by means of a deep trench method near the plant and on property just north west of the Police Village of St. Davids. This method has eliminated a pollution problem which formerly existed.

3. Industrial Waste Disposal

Avondale Dairy Limited

The Avondale Dairy disposes of its process waste water by means of a spray irrigation system and a broad irrigation system. Due to extensive ponding caused by the broad irrigation system, there is periodic overflowing of waste water to a ditch tributary to Eight Mile Creek. It has been recommended that the waste water be spray irrigated during the warm weather months and the broad irrigation

method be used during the winter months.

Canadian Cannery Limited - Plant #22

The Canadian Cannery Limited employs an extensive system of spray irrigation on 130 acres of bush and pasture land for the disposal of waste water. This system is well maintained, but run-off to Four Mile Creek has occurred because of prolonged wet periods and the poor percolation qualities of the clay soil. A buffer lagoon provides storage when excessive run-off from the irrigation fields occur.

Lakeshore Cannery

This plant ceased operation in the autumn of 1962, and it is uncertain at this time whether the plant will re-open. The waste water was formerly discharged to a retention lagoon and the liquid level was periodically lowered by means of spray irrigation. Muskrats frequently damaged the lagoon dykes, resulting in the discharge of untreated wastes to Four Mile Creek.

Avionics Limited

Fish kills in Two Mile Creek have previously been caused by the batch discharge of toxic chemicals from the Avionics Limited. This practice of waste disposal has apparently been discontinued and no problem has been experienced recently from this plant.

DISCUSSION OF SAMPLE ANALYSES

An explanation of the significance of the sample analyses is contained in the appendix and the location of the sampling points is indicated on the map enclosed with the report.

Two Mile Creek

<u>Date</u>	<u>Sample Pt. No.</u>	<u>Description</u>	<u>5-Day BOD (ppm)</u>	<u>Solids (ppm)</u>			<u>M.F. Coliforms per 100 ml</u>
				<u>Total</u>	<u>Susp.</u>	<u>Diss.</u>	
June 2/64	T 1.0	2 Mile Cr. at Lakeshore Rd.	1.4	570	2	568	2,600
June 2/64	T 1.7	2 Mile Cr. at Niagara Stone Road	1.3	542	1	541	600
June 2/64	T 3.4	2 Mile Cr. at Plum St.	1.0	740	1	739	42

The sanitary chemical quality of the water was satisfactory, but the bacterial quality at sample point T 1.0 was above the objective of a maximum of 2,400 coliforms per 100 ml.

Three Mile Creek

<u>Date</u>	<u>Sample Pt. No.</u>	<u>Description</u>	<u>5-Day BOD (ppm)</u>	<u>Solids (ppm)</u>			<u>M.F. Coliforms per 100 ml</u>
				<u>Total</u>	<u>Susp.</u>	<u>Diss.</u>	
June 2/64	TH0.3	3 Mile Cr. at Lakeshore Rd.	1.8	592	3	589	138
June 2/64	TH1.4	3 Mile Cr. at Hunter Road	6.2	804	90	714	540

The BOD at sample point TH 1.4, which is above the Commission's objective of 4 ppm, is suspected of being caused by a defective septic tank and tile bed system receiving the sanitary wastes from a separate school at this location.

Four Mile Creek

<u>Date</u>	<u>Sample Pt. No.</u>	<u>Description</u>	<u>5-Day BOD (ppm)</u>	<u>Solids (ppm)</u>			<u>M.F.Coliforms per 100 ml</u>
				<u>Total</u>	<u>Susp.</u>	<u>Diss.</u>	
June 2/64	F0.5	4 Mile Cr. at Lakeshore Rd.	1.1	538	4	534	1,100
June 2/64	F2.4	4 Mile Cr. at east and west road	1.8	600	10	590	2,700
June 2/64	FW2.5	4 Mile Cr. at west branch of east and west line	1.7	444	3	441	1,400
June 2/64	FS3.2	4 mile creek south branch at conc. road 6	1.4	574	7	567	224
June 2/64	F3.2	4 Mile Cr. at line 1	2.5	838	42	796	6,500
June 2/64	F4.6	4 Mile Cr. at line 3	19.0	822	8	814	3,100
June 2/64	FD8.7	4 Mile Cr. tributary at St. Davids	13.4	786	24	762	670,000
May 15/64	F7.0	4 Mile Cr. at line 7	2.8	654	14	640	12,000
May 15/64	FSW7.8	south west branch $\frac{1}{4}$ mile above junction	18.0	1506	37	1469	1,400
May 15/64	FD8.2	St. Davids branch just above junction	1.4	1498	7	1491	180
May 15/64	F8.2	4 Mile Cr. at line 9	2.0	572	10	562	22,000
May 15/64	F9.5	4 Mile Cr. at townline road, one mile south of St. Davids	0.9	568	11	557	730

Of the 12 stream samples collected, six samples exceed the Commission's objective of 2,400 coliform organisms, and three samples exceed the objective of four ppm of BOD. The cannery was not operating at the time of sampling which would indicate that the pollution detected may be attributed to domestic sources. The results confirm the previously mentioned observation regarding the discharging of sanitary wastes to the creek by homes in St. Davids, Virgil and some homes near the creek.

Six Mile Creek

<u>Date</u>	<u>Sample Pt. No.</u>	<u>Description</u>	<u>5-Day BOD (ppm)</u>	<u>Solids (ppm)</u>			<u>M.F.Coliforms per 100 ml</u>
				<u>Total</u>	<u>Susp.</u>	<u>Diss.</u>	
May 13/64	S0.1	6 Mile Cr. 0.1 miles from Lake Ontario	2.8	994	6	988	730
May 13/64	S0.8	6 Mile Cr. at Lakeshore Rd.	1.4	990	5	985	580
May 13/64	S3.9	6 Mile Cr. at Niagara Stone Rd.	1.6	1256	13	1243	80
May 13/64	S5.8	6 Mile Cr. at Hwy.#8	1.2	1330	19	1311	810

The samples from Six Mile Creek were all satisfactory with reference to the OWRC objectives

Eight Mile Creek

<u>Date</u>	<u>Sample Pt. No.</u>	<u>Description</u>	<u>5-Day BOD (ppm)</u>	<u>Solids (ppm)</u>			<u>M.F.Coliforms per 100 ml</u>
				<u>Total</u>	<u>Susp.</u>	<u>Diss.</u>	
May 13/64	E0.1	8 Mile Cr. 0.1 miles from Lake Ontario	2.6	300	7	293	870
May 13/64	E1.2	8 Mile Cr. at Church Rd.	1.9	248	12	236	1,020
May 13/64	E1.9	8 Mile Cr. at Scott Rd.	3.4	640	39	601	300
May 13/64	E2.5	8 Mile Cr. at Carlton Rd.	1.8	1018	9	1009	90
May 13/64	EW2.7	8 Mile Cr. west branch, at Carlton Road	1.8	216	18	198	52,000
Apr.30/64	EWA3.2	8 Mile Cr. ditch tributary from Avondale Dairy	16.0	590	52	538	45,000
May 13/64	EW4.4	8 Mile Cr. at Carlton Road at ship canal diversion	1.2	206	39	167	130

The quality of the water in Eight Mile Creek was satisfactory except in the vicinity of the Avondale Dairy Limited broad irrigation area. The adverse samples were collected at sample points EW2.7 and EWA3.2.

SUMMARY AND CONCLUSIONS

The water pollution survey indicated a need for improved sewage disposal practices in several sections of the township, particularly at Virgil and the Police Villages of Queenston and

St. Davids. The only area serviced by a sewerage system is at Mississauga Beach, but future sewer development in this area will be necessarily restricted to the capacity of the Town of Niagara waste stabilization pond.

The sewage disposal problems at Queenston could be resolved by a sewerage system with the Niagara River as the effluent receiver. This has been considered by the municipality but was postponed due to financial reasons.

At St. Davids and Virgil the Four Mile Creek would not constitute a suitable effluent receiver during the summer months. The solution would appear to be a waste stabilization pond with complete retention during periods of low stream flow. Initial action should involve a detailed survey of sewage disposal practices in the community of Virgil and the Police Village of St. Davids. If it appears unlikely that satisfactory solutions can be obtained by corrective action on an individual basis, then a preliminary engineering report should be prepared regarding a municipal sewage treatment works.

The township refuse disposal area located near Mississauga Beach is presently leaching material that could pollute Two Mile Creek and action should be taken to eliminate this threat.

Specific recommendations have been made to the industries in the township in separate reports regarding the improvement in their waste disposal facilities.

RECOMMENDATIONS

It is recommended that:

1. Action be taken to prevent the potential pollution of Two Mile Creek by leachate from the municipal refuse disposal area located near Mississauga Beach.
2. Consideration should be given to the provision of sewage works for the Police Village of Queenston.
3. If corrective action cannot be achieved on an individual basis, a preliminary engineering report should be prepared for sewage works at St. Davids and Virgil.
4. The industries should act on the recommendations contained in separate reports concerning their waste treatment facilities.

All of which is respectfully submitted

District Engineer


A. B. Redekopp

Approved by


K. H. Sharpe, Director

/ct

APPENDIX

EXPLANATION & SIGNIFICANCE OF LABORATORY ANALYSES

ALL THE LABORATORY TESTS INCLUDED IN THIS REPORT WERE PERFORMED AT THE ONTARIO WATER RESOURCES COMMISSION LABORATORY IN TORONTO.

A. BACTERIOLOGICAL EXAMINATION

THE MEMBRANE FILTER TECHNIQUE IS USED TO OBTAIN A DIRECT ENUMERATION OF COLIFORM ORGANISMS. THESE ORGANISMS ARE NORMAL INHABITANTS OF THE INTESTINES OF MAN AND OTHER WARM-BLOODED ANIMALS. THEY ARE ALWAYS PRESENT IN LARGE NUMBERS IN SEWAGE AND ARE GENERALLY MINIMAL IN OTHER WATER POLLUTANTS.

THE RESULTS OF THE EXAMINATIONS ARE REPORTED AS "MF COLIFORM COUNT PER 100 ML".

THE COMMISSION'S OBJECTIVE FOR STREAM SANITATION IS A COLIFORM DENSITY OF NOT GREATER THAN 2,400 ORGANISMS PER 100 ML.

B. SANITARY CHEMICAL ANALYSES

BIOCHEMICAL OXYGEN DEMAND (BOD):

BIOCHEMICAL OXYGEN DEMAND IS REPORTED IN PARTS PER MILLION (PPM), AND IS AN INDICATION OF THE AMOUNT OF OXYGEN REQUIRED FOR THE STABILIZATION OF DECOMPOSABLE ORGANIC MATTER IN THE WATER. THE COMPLETION OF THE LABORATORY TEST REQUIRES FIVE DAYS, UNDER THE CONTROLLED INCUBATION TEMPERATURE OF 20°C.

THE COMMISSION OBJECTIVE FOR STREAM WATER QUALITY IS AN UPPER LIMIT OF 4 PPM.

SOLIDS:

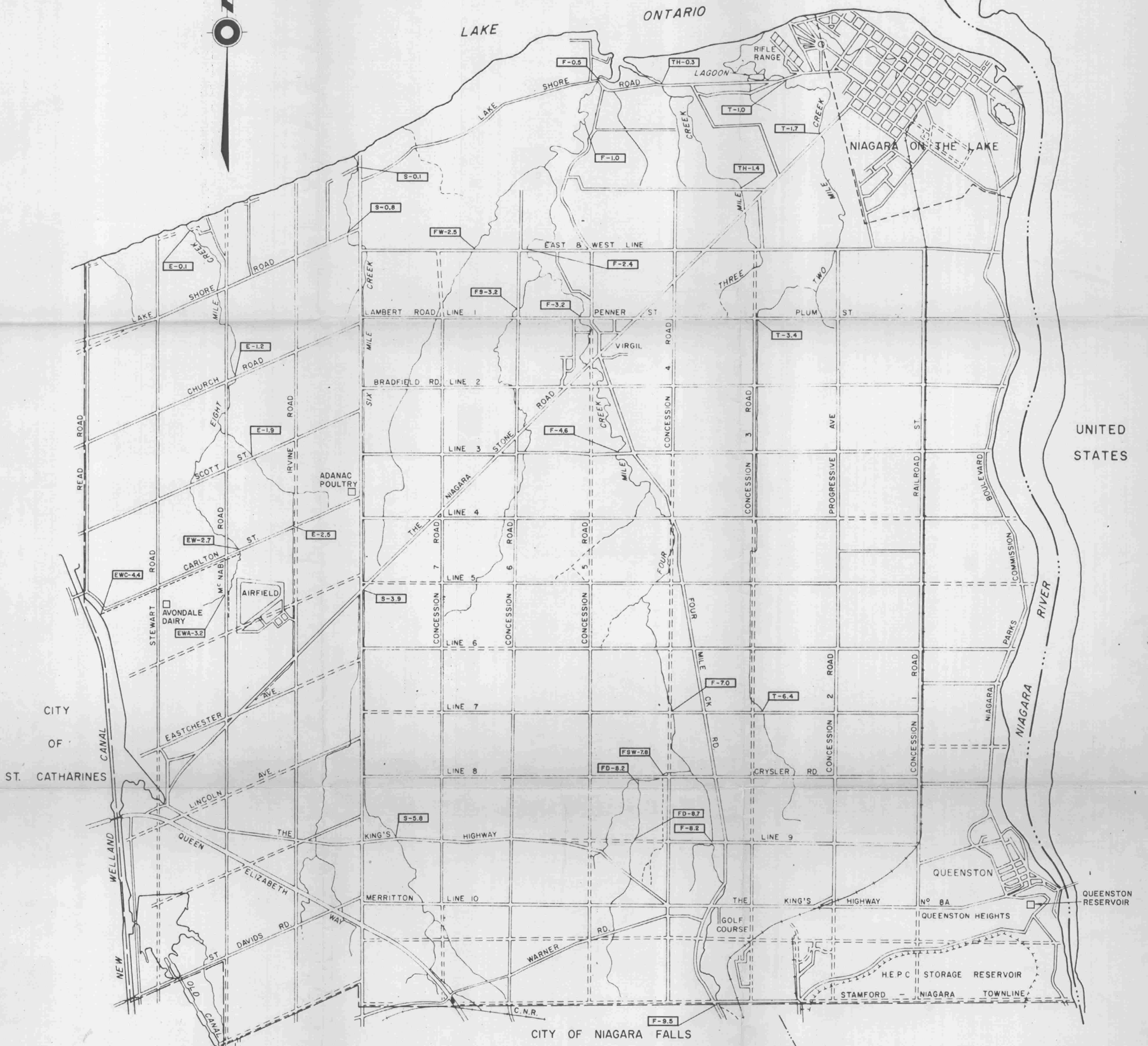
THE VALUE FOR TOTAL SOLIDS, EXPRESSED IN PARTS PER MILLION (PPM), IS THE SUM OF THE VALUES FOR THE SUSPENDED AND THE DISSOLVED MATTER IN THE WATER. THE CONCENTRATION OF SUSPENDED SOLIDS IS GENERALLY THE MOST SIGNIFICANT OF THE SOLIDS ANALYSES IN REGARD TO STREAM WATER QUALITY.

THE EFFECTS OF SUSPENDED SOLIDS IN WATER ARE REFLECTED IN DIFFICULTIES ASSOCIATED WITH WATER PURIFICATION, DEPOSITIONS IN STREAMS, AND INJURY TO THE HABITAT OF FISH.

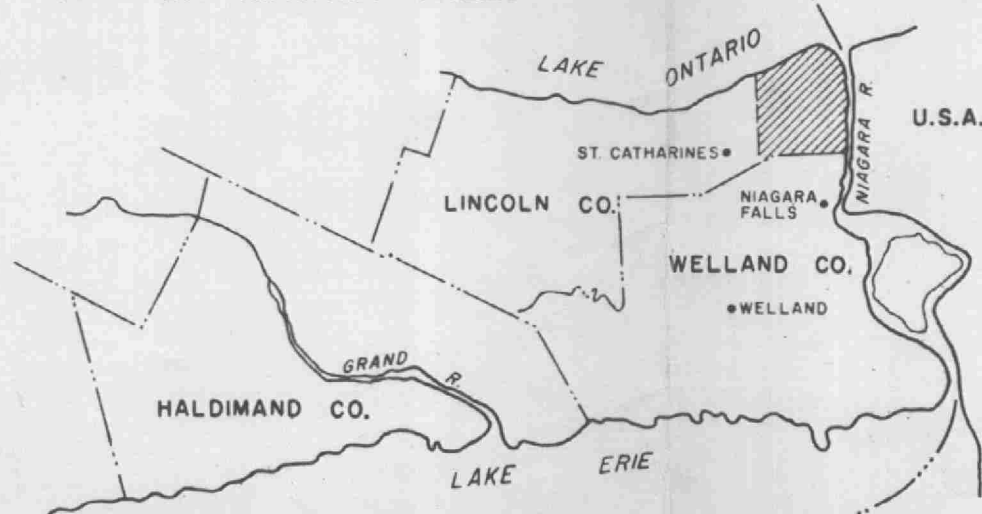
WHERE SUSPENDED SOLIDS VALUES ARE LESS THAN 20 PPM LABORATORY DIFFICULTIES ARE EXPERIENCED AND THE TURBIDITY IS DETERMINED INSTEAD.

TURBIDITY:

TURBIDITY IS CAUSED BY THE PRESENCE OF SUSPENDED MATTER, SUCH AS CLAY, SILT, FINELY DIVIDED ORGANIC MATTER, PLANKTON AND OTHER MICROSCOPIC ORGANISMS IN WATER. IT IS AN EXPRESSION OF THE OPTICAL PROPERTY OF A SAMPLE AND RESULTS ARE REPORTED IN "TURBIDITY UNITS".



LEGEND
S-3.9 - SAMPLING POINT SHOWING STREAM AND MILEAGE



ONTARIO WATER RESOURCES COMMISSION	
TOWNSHIP OF NIAGARA	
WATER POLLUTION SURVEY	
SCALE: 2" = 1 MILE	
DRAWN BY: A.R.S.	DATE: JULY, 1964
CHECKED BY:	DRAWING NO: 64-56